

What Is Claimed Is:

1 1. A method of determining the presence of a
2 nuclear localization signal in a protein of interest, the
3 method comprising:

4 selecting a host cell for use in the method, wherein
5 the host cell contains a nucleus having nucleic acid
6 encoding a reporter gene therein and wherein the host
7 cell has a first level of expression of the reporter
8 gene;

9 identifying a DNA binding domain and an activation
10 domain for the reporter gene;

11 constructing a chimeric nucleic acid encoding a
12 fusion protein comprising the DNA binding domain, the
13 activation domain, and a protein of interest, wherein
14 elements of the fusion protein other than the protein of
15 interest have no nuclear localization signals;

16 introducing the chimeric nucleic acid into the host
17 cell; and

18 determining a second level of expression of the
19 reporter gene to determine the presence of a nuclear
20 localization signal in the protein of interest.

1 2. The method of claim 1 wherein the host cell is
2 a eukaryotic cell.

1 3. The method of claim 1 wherein the host cell is
2 a yeast cell.

1 4. The method of claim 1 wherein the reporter gene
2 is a lacZ gene.

1 5. The method of claim 1 wherein the reporter gene
2 is a selection marker gene.

1 6. The method of claim 5 wherein the selection
2 marker gene is a HIS3 gene.

1 7. The method of claim 4 or 6 wherein the DNA
2 binding domain is a LexA protein.

1 8. The method of claim 4 or 6 wherein the
2 activation domain is a GAL4 activation domain.

1 9. The method of claim 1 wherein the chimeric
2 nucleic acid further comprises nucleic acid encoding a
3 promoter to control expression of the fusion protein.

1 10. The method of claim 9 wherein the promoter is
2 an ADH1 promoter.

1 11. A recombinant host cell comprising:
2 a nucleus having nucleic acid encoding a reporter
3 gene therein; and
4 a chimeric nucleic acid encoding a fusion protein,
5 the fusion protein comprising a DNA binding domain for
6 the reporter gene, an activation domain for the reporter
7 gene, and a protein of interest, wherein elements of the
8 fusion protein other than the protein of interest have no
9 nuclear localization signals.

1 12. The recombinant host cell of claim 11 wherein
2 the host cell is a eukaryotic cell.

1 13. The recombinant host cell of claim 11 wherein
2 the host cell is a yeast cell.

1 14. The recombinant host cell of claim 11 wherein
2 the reporter gene is a lacZ gene.

1 15. The recombinant host cell of claim 11 wherein
2 the reporter gene is a selection marker gene.

1 16. The recombinant host cell of claim 15 wherein
2 the selection marker gene is a HIS3 gene.

1 17. The recombinant host cell of claim 14 or 16
2 wherein the DNA binding domain is a LexA protein.

1 18. The recombinant host cell of claim 14 or 16
2 wherein the activation domain is a GAL4 activation
3 domain.

1 19. The recombinant host cell of claim 11 wherein
2 the chimeric nucleic acid further comprises nucleic acid
3 encoding a promoter to control expression of the fusion
4 protein.

1 20. The recombinant host cell of claim 19 wherein
2 the promoter is an ADH1 promoter.

1 21. A chimeric nucleic acid encoding a fusion
2 protein, the fusion protein comprising a DNA binding
3 domain for a reporter gene, an activation domain for the
4 reporter gene, and a protein of interest, wherein
5 elements of the fusion protein other than the protein of
6 interest have no nuclear localization signals.

1 22. The chimeric nucleic acid of claim 21 wherein
2 the reporter gene is a lacZ gene.

1 23. The chimeric nucleic acid of claim 21 wherein
2 the reporter gene is a selection marker gene.

1 24. The chimeric nucleic acid of claim 23 wherein
2 the selection marker gene is a HIS3 gene.

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1 25. The chimeric nucleic acid of claim 22 or 24
2 wherein the DNA binding domain is a LexA protein.

1 26. The chimeric nucleic acid of claim 22 or 24
2 wherein the activation domain is a GAL4 activation
3 domain.

1 27. The chimeric nucleic acid of claim 21 further
2 comprising nucleic acid encoding a promoter to control
3 expression of the fusion protein.

1 28. The chimeric nucleic acid of claim 27 wherein
2 the promoter is an ADH1 promoter.

1 29. A vector comprising the chimeric nucleic acid
2 of claim 21.

1 30. A kit comprising the vector of claim 29.

1 31. The kit of claim 30 further comprising host
2 cells which contain a nucleus having nucleic acid
3 encoding the reporter gene therein.

1 32. The kit of claim 31 further comprising a
2 control vector.

1 33. A nucleic acid molecule encoding a modified
2 LexA protein, wherein the modified LexA protein has no
3 nuclear localization signal.

1 34. The nucleic acid molecule of claim 33 wherein
2 the nucleic acid molecule has a nucleotide sequence as
3 shown in SEQ ID NO:1.

1 35. The nucleic acid molecule of claim 33 wherein
2 the nucleic acid molecule encodes an amino acid sequence
3 as shown in SEQ ID NO:2.

1 36. A modified LexA protein, wherein the modified
2 LexA protein has no nuclear localization signal.

1 37. The modified LexA protein of claim 36 wherein
2 the protein has an amino acid sequence as shown in SEQ ID
3 NO:2.

1 38. A method of determining the presence of a
2 nuclear export signal in a protein of interest, the
3 method comprising:
4 selecting host cells for use in the method, wherein
5 each of the host cells contain a nucleus having nucleic
6 acid encoding a reporter gene therein;
7 identifying a DNA binding domain and an activation
8 domain for the reporter gene;
9 constructing a chimeric nucleic acid encoding a
10 fusion protein comprising the DNA binding domain, the
11 activation domain, and a nuclear localization signal,
12 wherein elements of the fusion protein have no nuclear
13 export signals;
14 introducing the chimeric nucleic acid into one of
15 the host cells;

16 determining a first level of expression of the
17 reporter gene;
18 constructing a second chimeric nucleic acid encoding
19 a second fusion protein comprising the DNA binding
20 domain, the activation domain, the nuclear localization
21 signal, and a protein of interest;
22 introducing the second chimeric nucleic acid into
23 another one of the host cells; and
24 determining a second level of expression of the
25 reporter gene to determine the presence of a nuclear
26 export signal in the protein of interest.

1 39. The method of claim 38 wherein the host cells
2 are eukaryotic cells.

1 40. The method of claim 38 wherein the host cells
2 are yeast cells.

1 41. The method of claim 38 wherein the reporter
2 gene is a lacZ gene.

1 42. The method of claim 38 wherein the reporter
2 gene is a selection marker gene.

1 43. The method of claim 42 wherein the selection
2 marker gene is a HIS3 gene.

1 44. The method of claim 38 wherein the nuclear
2 localization signal is an SV40 nuclear localization
3 signal.

1 45. The method of claim 41 or 43 wherein the DNA
2 binding domain is a LexA protein.

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1 46. The method of claim 41 or 43 wherein the DNA
2 binding domain and the nuclear localization signal are a
3 LexA protein.

1 47. The method of claim 41 or 43 wherein the
2 activation domain is a GAL4 activation domain.

1 48. The method of claim 38 wherein the chimeric
2 nucleic acid further comprises nucleic acid encoding a
3 promoter to control expression of the fusion protein.

1 49. The method of claim 38 wherein the second
2 chimeric nucleic acid further comprises nucleic acid
3 encoding a promoter to control expression of the second
4 fusion protein.

1 50. The method of claim 48 or 49 wherein the
2 promoter is an ADH1 promoter.

1 51. A recombinant host cell comprising:
2 a nucleus having nucleic acid encoding a reporter
3 gene therein; and
4 a chimeric nucleic acid encoding a fusion protein,
5 the fusion protein comprising a DNA binding domain for
6 the reporter gene, an activation domain for the reporter
7 gene, and a nuclear localization signal, wherein elements
8 of the fusion protein have no nuclear export signals.

1 52. The recombinant host cell of claim 51 wherein
2 the fusion protein further comprises a protein of
3 interest.

1 53. The recombinant host cell of claim 51 wherein
2 the host cell is a eukaryotic cell.

1 54. The recombinant host cell of claim 51 wherein
2 the host cell is a yeast cell.

1 55. The recombinant host cell of claim 51 wherein
2 the reporter gene is a lacZ gene.

1 56. The recombinant host cell of claim 51 wherein
2 the reporter gene is a selection marker gene.

1 57. The recombinant host cell of claim 56 wherein
2 the selection marker gene is a HIS3 gene.

1 58. The recombinant host cell of claim 51 wherein
2 the nuclear localization signal is an SV40 nuclear
3 localization signal.

1 59. The recombinant host cell of claim 55 or 57
2 wherein the DNA binding domain is a LexA protein.

1 60. The recombinant host cell of claim 55 or 57
2 wherein the DNA binding domain and the nuclear
3 localization signal are a LexA protein.

1 61. The recombinant host cell of claim 55 or 57
2 wherein the activation domain is a GAL4 activation
3 domain.

1 62. The recombinant host cell of claim 51 wherein
2 the chimeric nucleic acid further comprises nucleic acid
3 encoding a promoter to control expression of the fusion
4 protein.

1 63. The recombinant host cell of claim 62 wherein
2 the promoter is an ADH1 promoter.

1 64. A chimeric nucleic acid encoding a fusion
2 protein, the fusion protein comprising a DNA binding
3 domain for a reporter gene, an activation domain for the
4 reporter gene, and a nuclear localization signal, wherein
5 elements of the fusion protein have no nuclear export
6 signals.

1 65. The chimeric nucleic acid of claim 64 wherein
2 the fusion protein further comprises a protein of
3 interest.

1 66. The chimeric nucleic acid of claim 64 wherein
2 the nuclear localization signal is an SV40 nuclear
3 localization signal.

1 67. The chimeric nucleic acid of claim 64 wherein
2 the DNA binding domain is a LexA protein.

1 68. The chimeric nucleic acid of claim 64 wherein
2 the DNA binding domain and the nuclear localization
3 signal are a LexA protein.

1 69. The chimeric nucleic acid of claim 64 wherein
2 the activation domain is a GAL4 activation domain.

1 70. The chimeric nucleic acid of claim 64 wherein
2 the chimeric nucleic acid further comprises nucleic acid
3 encoding a promoter to control expression of the fusion
4 protein.

1 71. The chimeric nucleic acid of claim 70 wherein
2 the promoter is an ADH1 promoter.

1 72. A vector comprising the chimeric nucleic acid
2 of claim 64.

1 73. A kit comprising the vector of claim 72.

1 74. The kit of claim 73 further comprising host
2 cells which contain a nucleus having nucleic acid
3 encoding the reporter gene therein.

1 75. The kit of claim 74 wherein the reporter gene
2 is a lacZ gene.

1 76. The kit of claim 74 wherein the reporter gene
2 is a selection marker gene.

1 77. The kit of claim 76 wherein the selection
2 marker gene is a HIS3 gene.

1 78. The kit of claim 73 further comprising a
2 control vector.